Welds prototype rapid exhaust parts

The latest technique for rapid prototyping builds up parts in welded metal

Design Pointers

- Process produces metal components by laying down a continuous weld bead
- Surface finish and metallurgical integrity is generally sufficient to allow components to be used in the as produced condition. Combinations of metals can also be employed by stopping the welding processes, changing the weld wire and restarting.

By depositing a continuous bead of weld metal, it is possible to build up rapid prototyped parts in steel to almost any size.

The technique is already being used by an unnamed aerospace company and shows potential for making prototyped parts for exhaust systems. It can be applied to almost any weldable metal or combination of metals.

Dr Antonio Fernando Ribeiro, formerly at Cranfield, but now at the University of Minho in Guimarães, Portugal, has developed a technique for building up metal parts using robot welding.

The process works in essentially the same way as any other layer-by-layer rapid prototyping technique, except that the usual plastic deposition processing equipment is replaced by a rotatable table, a robot arm and an arc welding torch.

In the prototype system, designs are first prepared using 486PC based 3D CAD. Once in digital form, the design is subjected to a post-processing program written by Dr Ribeiro which automatically transforms the 3D shape into robot movements. The program takes into account weld-bead geometry and material and can be configured for any robot language.

With the robot program generated, the work cell process may be simulated with WorkSpace 3.0, developed by Robot Simulations of Newcastle. An ABB Program, Off-Line 3.0, is then used to compile and download instructions to the ASEA 2000 IRb robot over an RS232C link.

Dr Ribeiro has made a number of test forms, including vases, steel beer glasses, and various solid and re-entrant shapes. He finds that it is possible to build up components quite quickly, because weld beads cool and solidify in a few seconds. Components can be made out of more than one metal, by stopping and changing the welding torch wire, and there is no practical limit to size. The robot cell equipment for the process is less expensive than for many plastic-based rapid prototyping techniques, and directly produces items which can be used.

Surface finish and internal integrity is generally found sufficient to allow components to be used as they are, without further machining.

FOR MORE INFORMATION

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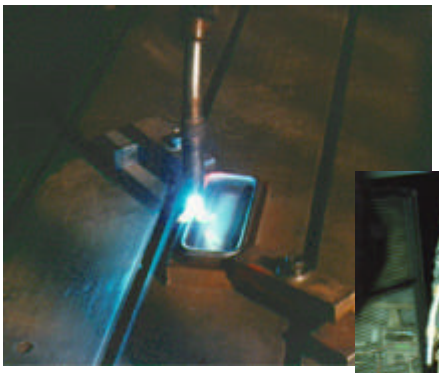

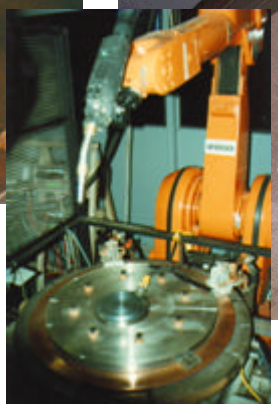

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